REMARKS

Claims 1-64 are pending in the application. Claims 23-64 are withdrawn from consideration. Claims 1-22 are presented for consideration. No claim is amended. No claim is cancelled.

Claims 1-22 stand rejected under 35 U.S.C. §102(b) as being anticipated by EP 0630044 to Okumura et al., hereinafter referred to as Okumura.

The Office Action states that, "Okumura, in the abstract, in col. 2, lines 24-57, in col. 3, lines 14-58, in col. 4, lines 1-56, discloses a pattern forming method of forming a mask having pattern forming openings (photolithographically formed photoresist pattern, reference 43, of figures 4A through 4D), immersing the substrate with openings to a predetermined solution to fill the opening with the material (solidified liquid pattern material, drying the liquid solution adhered onto the opening so as to form a layer in the opening, the SOG layer or SiO2 layer is solidified, palladium layer (electrically conductive layer) formed in the openings)".

Applicants respectfully disagree. Firstly, Applicants point out that claim 1 recite, "supplying and ***solidifying*** an ***electrically conductive*** liquid pattern material in the pattern-forming openings of the mask." Applicants were unable to locate an abstract in the Okumura reference, but a study of the Okumura text showed that it does not recite, teach, or suggest solidifying an electrically conductive liquid pattern material.

Firstly, col. 2, lines 24-57 (as cited in the Office Action) describe (col. 2, lines 34-35) immersing substrate 30 in a "silicofluoride aqueous solution", which is not electrically conductive. Okumura explain that the "silicofluoride aqueous solution" reacts with exposed tungsten silicide (Wsi) 31 to form silicon oxide (SiO_2) (col. 2, lines 35-39). Since the resultant solid, (SiO_2), is dissimilar from the solution (silicofluoride aqueous solution), it is self-evident that the resultant solid is not a *solidified* form of the solution. Thus, Applicants respectfully put forth that col. 2, lines 24-57 do not teach an electrically <u>conductive</u> liquid pattern material nor teach <u>solidifying</u> the electrically conductive liquid pattern material.

Col. 3, lines 14-58 (as cited in the Office Action) also describe immersing the substrate into a silicofluoride aqueous solution to form SiO_2 after applying a hydrophobic treatment to the substrate (col. 3, lines 23-26). As is explained

immediately above, the silicofluoride aqueous solution does not read on the claimed *electrically conductive* liquid pattern material, and its use in a chemical reaction to grow SiO_2 is incompatible with the presently claimed limitation that the liquid be solidified.

Col. 4, lines 1-56 (as cited in the Office Action) describe two separate processes. The first process (col. 3 ,line 54 to col. 4, line 18) describes the same process of forming SiO_2 by applying a hydrophobic treatment to a photoresist pattern 54 and subsequently submersing the substrate into a silicofluoride aqueous solution (col. 4, lines 5-7). As is explained above, this process does not read on the present invention.

The second process described in Col. 4, lines 1-56, explains that after photoresist layer 63 is subjected to a hydrophobic treatment (col. 4, lins 28-29), the substrate is immersed into a solution of palladium chloride ($PdCl_2$) "to form a palladium layer 64 of less than 100 Å using a non-electric plating method" (col. 4, lines 30-35). The substrate is then immersed into a mixed solution of "nickel sulfate ($NiSO_4$) and hypophosphate to form a nickel layer 64. While it is not clear if palladium chloride is conductive, it is clear that the plating of a surface is not the same as the solidifying of a liquid. That is, non-electric plating (or electroless plating, as it is more commonly known) is a process of chemical plating that involves several simultaneous reactions in an aqueous solution. The chemical reaction is typcially accomplished when hydrogen is released by a reducing agent and oxidized thus producing a negative charge on a surface. Irrespective of the exact checmial reaction, using an aquas solution to induce a chemcial reaction to plate a material surface is clearly not the same as solifying the solution. Indeed, one is altering the chemical makeup of the solution to release the element that is to be plated onto a given surface, but the solution remain aqueous. Thus, Applicants contend that using an aqueous solution in a plating process does read on the claimed process of "solifying" a an electrically conductive liquid pattern material. Indeed, after Okumura's plating process is complete, a residue aqueous solution is still present, albeit in a chemically altered form, and thus the solution has not been solidified.

The Office Action also appears to suggest that that the solidified liquid pattern material may be glass or silicon oxide since it states that (page 2, sect. 2,

lines 8-9) "the SOG layer or SiO_2 layer is solidified". Applicant respectfully point out that SOG, or spin-on-glass, is a process for forming a glass layer and is not itself a liquid. Nonetheless glass is an insulator, not a conductor, and thus cannot read on the present claims. Furthermore, all of Okumura's relevant processes recite the SOG process *before* any hydrophobic step, whereas in the present invention the electrically conductive liquid pattern material would be applied *after* the hydrophobic step. Furthermore, Applicants also point out that SiO_2 is a solid, not a liquid, and thus cannot read on the present invention.

The Office Action notes that Okumura recites "performing a baking treatment", and asserts that this reads on the present claims. However, the present claims, for example claim 12, recite that that, "the liquid-pattern material is solidified by applying heat", whereas Okumura explains that his solutions are used in chemical reactions to create a new material, typically an insulative material. Additionally, Applicants respectfully point out that the present claims recite solidifying the liquid by first applying a heating processes, followed by an annealing process. This two-step process is not taught or suggested by Okumura.

The Office Action also asserts that Okumura teaches repeated immersions of the substrate into the same solution to form another layer of the same material. Applicants respectfully disagree, and request that it be noted where Okumura describes such repeated processes using the same materials.

Lastly in reference to the "Response to Arguments" section, specifically, part A, the Office Action suggest that, "the features upon which applicant relies (i.e., liquid pattern material is solidified to form a layer) are not recited in the rejected claim(s)". Applicant are unclear as to what the Office Action means since claim 1 clearly recites, "solidifying an electrically conductive liquid pattern material in the pattern-forming openings of the mask", and as it is known in the art of IC device design and manufacturing, each solid element in an IC process constitutes a layer.

In part B of the "Response to Arguments", the Office Action notes that Applicants previously argued that, "Okumura does not disclose forming an electrically conductive liquid pattern material in the openings in the mask as recited in claims 1, 4, and 7", but then asserts that,

> "Okumura, in col 4, lines 42-50, discloses that the device with the photoresist mask pattern is immersed in a solution containing palladium and after immersing and plating the device is removed thereby forming in the openings an electrically conducting palladium layer which is no longer in solution (or liquid state) but solidified in the openings."

Applicants respectfully disagree and point out that plating a surface (either by electroplating or electroless plating) is a chemical reaction process that typically requires submersion of an article in a solution. The resultant plated layer on the article is unrelated to the solution, and cannot be said to constitute a solidifying of the solution. Indeed, after the plating process, the solution will remain, albeit in an altered form, but still very much a liquid. Thus, Applicants request reconsideration of this Office Action assertion.

In part D of the "Response to Arguments", the Office Action states that Applicants argue that Okumura does not disclose the two-step process of evaporation and annealing, but then assert that in,

> "Okumura, in col 3, lines 16-32, discloses that spin-on-glass material is formed (spray or spin coating the spin-on-glass liquid material) in the openings of the photoresist mask, followed by baking. Baking involves evaporating as well as annealing, since baking involves heating to a high temperature."

Applicants respectfully disagree, it is not clear that baking temperatures are necessarily higher than annealing temperatures. Nonetheless, Applicant respectfully point out that Okumura does not teach a spin-on-glass process "followed by baking" (i.e. the glass is already melted). Rather Okumura explains that that spin-on-glass process is conducted after baking (i.e. col. 3, lines 18-19, "(SOG) method *following* a baking treatment"), and thus the glass is not baked, evaporated, or annealed since this would result in glass being melted again. Secondly, the SOG process is recited *before* the hydrophobic process (col. 3, line 23), and thus does not read on much of the claimed process. Thirdly, glass is an insulator, not a conductive liquid material, and thus reads on none of the claimed processes.

In summary, since Okumura's teachings do not read on the presently claimed invention, at least the rejections under 35 U.S.C. §102 are inappropriate.

Furthermore, in as much as an insulator is directly opposite to a conductor, and the altering of a surface on a test article submerged in a solution (by a plating process) is not equivalent to solidification of the solution, Okumura does not suggest the present invention.

This Response After Final Rejection is believed to place this application in condition for allowance and its entry is therefore believed proper Under 37 CFR §1.116. Accordingly, entry of this Response After Final Rejection, as an earnest attempt to advance prosecution and reduce the number of issues, is respectfully requested. Should the Examiner believe that issues remain outstanding, he/she is respectfully requested to contact applicants' undersigned attorney in an effort to resolve such issues and advance the case to issue.

Respectfully submitted,

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